

## PATENT ABSTRACTS OF JAPAN

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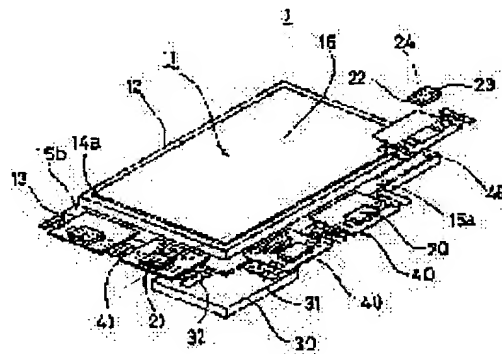
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## (54) DISPLAY DEVICE AND IC CHIP USED FOR THE SAME

## (57)Abstract:

PROBLEM TO BE SOLVED: To diminish the area of peripheral parts where images are not displayed.

SOLUTION: Driving ICs 20, 21 for driving the electrode substrate of a display panel have bypass input terminals 22, bypass output terminals 23 and bypass wirings 24 in ICs for shorting both terminals. The bypass wiring output terminal 23 of the one driving IC is connected to the input terminal 22 of the other adjacent driving IC via the inter-driving IC connecting wirings, by which the plural driving ICs 20, 21 disposed in one row are connected to each other.



## LEGAL STATUS

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## CLAIMS

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### [Claim(s)]

[Claim 1] In the display with which two or more drive IC chips aligned along the end side of one [ at least ] aforementioned electrode substrate at the single tier including the electrode substrate of a couple It has the bypass wiring in IC whose aforementioned drive IC short-circuits a bypass input terminal, a bypass output terminal, and an ends child. By connecting the aforementioned bypass wiring output terminal of the aforementioned drive IC of 1 to the input terminal of other aforementioned drives IC through drive-IC connection wiring With the control signal with which it connects mutually and two or more aforementioned drives IC are supplied to the drive IC of the above 1, or the aforementioned control signal Display characterized by inputting both power supply current, or both [ one side or ] into the aforementioned bypass input terminal of the drive IC of the above 1, and supplying them to the drive IC of above others through the aforementioned bypass output terminal from the aforementioned bypass wiring in IC.

[Claim 2] The aforementioned drive IC is the display according to claim 1 characterized by equipping other one side which a bypass input terminal is prepared in one side of the aforementioned alignment direction and the crossing direction, and counters one of them with a bypass output terminal.

[Claim 3] The display according to claim 1 carried out that one side of two electrode substrates form the aforementioned display panel projects outside, form a shelf, the aforementioned drive IC chip is directly carried in shelving of the aforementioned electrode substrate, the aforementioned drive-IC connection wiring is directly formed in shelving of the aforementioned electrode substrate, and two or more aforementioned drives IC are mutually connected through the aforementioned IC connection wiring of shelving of the aforementioned electrode substrate as the feature.

[Claim 4] Display according to claim 1 characterized by carrying the aforementioned drive IC chip on TAB, forming the aforementioned drive-IC connection wiring into TAB, and connecting two or more aforementioned drives IC mutually through the aforementioned IC connection wiring under above TAB.

[Claim 5] Form the main bypass wiring in shelving of the aforementioned electrode substrate, and two or more service wire which branches from the aforementioned main bypass wiring and is connected with each aforementioned drive IC, respectively is prepared. Both or one side of the aforementioned power supply current and the aforementioned earth current is supplied to two or more aforementioned drive IC chips through the aforementioned main bypass wiring and the aforementioned service wire, respectively. The aforementioned control signal is the display according to claim 3 characterized by supplying two or more the aforementioned drives IC of all through the bypass input terminal of the drive IC of 1, the aforementioned bypass wiring in IC, and the aforementioned wiring between ICs.

[Claim 6] The main bypass wiring is formed in the aforementioned electrode substrate in which the aforementioned drive IC was carried, and the substrate of another side which makes a pair. Two or more service wire which branches from the aforementioned main bypass wiring and is connected with each aforementioned drive IC, respectively is prepared. Both or one side of the aforementioned power supply current and the aforementioned earth current is supplied to two or more aforementioned drive IC chips through the aforementioned main bypass wiring and the aforementioned service wire, respectively. The aforementioned control signal is the display according to claim 3 characterized by supplying two or more the aforementioned drives IC of all through the bypass input terminal of the drive IC of 1, the aforementioned bypass wiring in IC, and the aforementioned wiring between ICs.

[Claim 7] IC chip characterized by having the bypass wiring in IC which a bypass input terminal and a bypass output terminal are prepared in IC main part, and short-circuits the aforementioned bypass input terminal and the aforementioned bypass output terminal in IC chip which drives the electrode substrate of a display panel.

[Claim 8] IC chip according to claim 7 characterized by having prepared the aforementioned bypass input terminal the demerits side of the aforementioned IC chip main part of a flat-surface rectangle, and preparing the aforementioned bypass output terminal other demerits sides which counter it.

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[Translation done.]

## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the wiring at the time of two or more IC chips being arranged by \*\*\*\* of this display at a single tier, and mounting structure about IC chip used for matrix type display and this.

[0002]

[Description of the Prior Art] Wiring and mounting structure of the conventional liquid crystal display are explained based on drawing 7 -10.

[0003] The 1st wiring and mounting structure are explained based on drawing 7 -9.

[0004] The matrix type liquid crystal display 100 is constituted by the printed-circuit board 130 which supplies a control signal to the drive IC chip 120,121 which drives a liquid crystal cell 111 and a liquid crystal cell, and a drive IC chip, and the wiring structure which connects them. A liquid crystal cell 111 sandwiches the liquid crystal matter 117 in the shape of sandwiches combining two transparent substrates 112,113 which usually consist of glass, and the sealing compound 118 is allotted to 4 rounds of this liquid crystal matter. On the downward (seeing from a display side background) transparent substrate 113 (array substrate), switching elements, such as a TFT transistor for turning a pixel and a pixel on and off, are formed in the shape of a matrix. And two or more IC chips 120,121 for a drive of this liquid crystal cell 111 for driving [ in / 2 \*\*\*\* / at least ] the aforementioned switching element are arranged for every end side.

[0005] In such structure common to a matrix type liquid crystal display, this IC chip 120,121 for a drive is carried on TAB140,141, and the connection with the matrix-like wiring in a liquid crystal cell 111 from this IC chip 120,121 for a drive is made by the wiring 145 packed into TAB140,141, and the end-connection child. The transparent substrate 113 of the lower part of a liquid crystal cell 111 projects from a liquid crystal cell 111, and connection between TAB140,141 and a liquid crystal cell 111 is made in the shelf 115 the bottom.

[0006] The input from the aforementioned printed-circuit board 130 to this IC120,121 for a drive is performed through the contact hole 132 for branching from two or more bypass wiring 131 embedded to the printed-circuit board 130 interior of this, and those each, and pulling out on the front face of this printed-circuit board 130, the output terminal 133 prepared in this printed-circuit board 130 front face and the input terminal 142 of TAB140,141, and the wiring 147 in TAB.

[0007] The above connections with IC120,121 for a drive from a printed-circuit board 130 are called cascade connection from bypass wiring.

[0008] With such structure, in order to see end-connection child 142 portion to about [ that wiring becomes complicated ] and TAB140,141, and bypass wiring 131 portion in a printed-circuit board 130 from a liquid crystal cell and to prepare in the outside of the IC chip 120,121 for a drive, TAB140,141 portion and a printed-circuit board 130 will become that much large.

[0009] The 2nd wiring and mounting structure are explained based on drawing 10.

[0010] In the structure common to the above matrix type liquid crystal displays, the shelf 115 which the downward transparent substrate 113 projected from the liquid crystal cell 111 is formed quite greatly, the aforementioned IC chip 120,121 for a drive is directly laid on a part for this shelf 115, and the connection wiring to a liquid crystal cell 110 from this IC chip 120,121 for a drive is formed as a direct metal thin film on this shelf 115. Moreover, the bypass wiring 151 for telling the control current etc. from a printed-circuit board 130 to the IC chip 120,121 is altogether formed on the shelf 115 which the transparent substrate of the aforementioned lower part projected. Although two or more bypass wiring 151 on the shelf 115 of a transparent substrate is seen from a liquid crystal cell 111 and it is allotted to the outside of the IC chip 120,121, it did not have branching but the detour which is once hidden in the bottom, and makes a U-turn and comes out in each drive IC chip 120,121 is accomplished. Here, connection between the bypass wiring 151 and the drive IC chip 120,121 is made by the output terminal 153 prepared in the place where the detour of the bypass wiring 151 is hidden in the drive IC chip

bottom, and the IC input terminal 127 which saw from the liquid crystal cell 111 of this drive IC chip 120,121, and was prepared in the outside \*\*\*\* bottom.

[0011] TAB140,141 which looked at from the liquid crystal cell 111, and has been projected outside according to the above-mentioned structure while becoming simple wiring structure compared with the wiring using the cascade connection in the 1st aforementioned wiring is lost.

[0012] However, in the 2nd wiring and mounting structure, since area of a picture non-display field in a liquid crystal display panel was not able to be made sufficiently small since it projects from a liquid crystal cell 111 and the area for a shelf 115 becomes large the bottom, and the long bypass wiring 151 of line length was altogether formed by the metal thin film on a transparent substrate, there was a problem that wiring resistance became large.

[0013]

[Problem(s) to be Solved by the Invention] In the above Prior arts, it was difficult in matrix type display to make sufficiently small area of the portion as which the picture in a display panel is not displayed. Moreover, in the COG method which can make this area comparatively small, in order to form the bypass wiring for Drive IC as a metal thin film on a transparent substrate, wiring resistance is strong, the functional disorder and also poor display of the drive IC by the bird clapper were caused, and it had become a problem.

[0014] Then, this invention offers the matrix type display which can do wiring and mounting work easy while being able to make area of a non-display portion small into a display panel in view of the above troubles.

[0015]

[Means for Solving the Problem] In the display with which, as for the display of the claim 1 of this invention, two or more drive IC chips aligned along the end side of one [ at least ] aforementioned electrode substrate at the single tier including the electrode substrate of a couple It has the bypass wiring in IC whose aforementioned drive IC short-circuits a bypass input terminal, a bypass output terminal, and an ends child. By connecting the aforementioned bypass wiring output terminal of the aforementioned drive IC of 1 to the input terminal of other aforementioned drives IC through drive-IC connection wiring With the control signal with which it connects mutually and two or more aforementioned drives IC are supplied to the drive IC of the above 1, or the aforementioned control signal Both power supply current, or both [ one side or ] is inputted into the aforementioned bypass input terminal of the drive IC of the above 1, and they are supplied to the drive IC of above others through the aforementioned bypass output terminal from the aforementioned bypass wiring in IC.

[0016] Since it is contained between the interior of Drive IC, and Drive IC in the form which the wiring for telling the control signal from the outside penetrates two or more drives IC to two or more drives IC, and connects to them by the above-mentioned composition and both power supply current, or both [ one side or ] is further contained similarly depending on the case, area as which a picture is not displayed in a liquid crystal display can be made small. Moreover, since it becomes simple wiring, a manufacturing process can be simplified and poor wiring can be reduced.

[0017] The display of a claim 2 is connected to the output terminal prepared in other shorter sides from the input terminal prepared the demerits side of the drive IC of a flat-surface rectangle by the bypass wiring in IC in the thing of a claim 1.

[0018] Distance of wiring between ICs can be made into the shortest by such composition.

[0019] The display of a claim 3 on the shelf which one side of two electrode substrates which form the aforementioned display panel projected outside, and formed in the upper surface in the thing of a claim 1 The drive IC chip which drives the aforementioned electrode substrate is carried directly, and the aforementioned drive-IC connection wiring is directly formed in shelving of the aforementioned electrode substrate, and is mutually connected through the aforementioned IC connection wiring of shelving of two or more aforementioned drives IC of the aforementioned electrode substrate.

[0020] Since the ratio into which the thin film wiring on a transparent substrate occupies the area of the same non-display field as a claim 1 in addition to the operation made small can be lessened according to the above-mentioned structure, the functional disorder of the drive IC by wiring resistance which

becomes a problem by the COG method can be reduced.

[0021] In the thing of a claim 1, the aforementioned drive IC chip is carried on TAB, the aforementioned drive-IC connection wiring is formed into TAB, and, as for the display of a claim 4, two or more aforementioned drives IC are mutually connected through the aforementioned IC connection wiring under above TAB.

[0022] The display of a claim 5 forms the main bypass wiring in shelving of the aforementioned electrode substrate in the thing of a claim 3. Two or more service wire which branches from the aforementioned main bypass wiring and is connected with each aforementioned drive IC, respectively is prepared. Both or one side of the aforementioned power supply current and the aforementioned earth current is supplied to two or more aforementioned drive IC chips through the aforementioned main bypass wiring and the aforementioned service wire, respectively. The aforementioned control signal is supplied to two or more the aforementioned drives IC of all through the bypass input terminal of the drive IC of 1, the aforementioned bypass wiring in IC, and the aforementioned wiring between ICs.

[0023] The display of a claim 6 forms the main bypass wiring in the thing of a claim 3 on the aforementioned electrode substrate in which the aforementioned drive IC was carried, and the substrate of another side which makes a pair. Two or more service wire which branches from the aforementioned main bypass wiring and is connected with each aforementioned drive IC, respectively is prepared. Both or one side of the aforementioned power supply current and the aforementioned earth current is supplied to two or more aforementioned drive IC chips through the aforementioned main bypass wiring and the aforementioned service wire, respectively. The aforementioned control signal is supplied to two or more the aforementioned drives IC of all through the bypass input terminal of the drive IC of 1, the aforementioned bypass wiring in IC, and the aforementioned wiring between ICs.

[0024] The bypass input terminal and the bypass output terminal were prepared in IC main part, and IC chip for a display drive of a claim 7 is equipped with the bypass wiring in IC which short-circuits the aforementioned bypass input terminal and the aforementioned bypass output terminal.

[0025] In IC chip of a claim 7, as for IC chip of a claim 8, the aforementioned bypass output terminal is prepared other demerits sides where the aforementioned bypass input terminal is prepared and counters it the demerits side of the aforementioned IC chip main part of a flat-surface rectangle.

[0026]

[Embodiments of the Invention] Hereafter, the 1st example of this invention is explained based on drawing 1 -2.

[0027] A sign 1 shows the liquid crystal display which has the structure called a TAB method or OLB (Outer Lead Bonding) method. the liquid crystal matter -- two glass substrates 12 and 13 -- inserting -- a liquid crystal cell 11 -- forming -- \*\*\*\* -- the upper part (side front) of this liquid crystal cell -- all are the image display fields 16 of a liquid crystal display 1 mostly Here, the size of the downward glass substrate 13 is somewhat larger than a glass substrate 12, and the shelf 15 which the downward glass substrate projected is formed in one long side of a liquid crystal cell 11, and one shorter side.

[0028] It is IC chip for a signal-line drive (henceforth an X side IC chip), and a sign 20 sets a predetermined interval, and three pieces approach shelf 15a by the side of the long side of a liquid crystal cell 11, and it is arranged.

[0029] A sign 21 is a scanning-line mechanical-component side IC chip (henceforth a Y side IC chip), and two pieces approach shelf 15b by the side of the shorter side of a liquid crystal cell 11, and it is arranged. The X side and a Y side IC chip are abbreviation rectangles. Moreover, the X side and a Y side IC chip have the bypass wiring 24 from a demerits side side to another shorter side side inside, and the input/output terminals 22 and 23 of these wiring are formed in both the shorter side lower part.

[0030] A sign 30 is a printed-circuit board and is a connection wiring substrate for making connection from an external input signal line and the drive IC chip 20, and connection between 21. This printed-circuit board has the form cut out from the abbreviation square by the abbreviation square in one angle, i.e., thick L typeface, and the portion which it projects from a liquid crystal cell 11, and shelf 15a by the side of the angle of the aforementioned shelf 15, i.e., the long side of a liquid crystal cell, (X side) and shelf 15b by the side of a shorter side (Y side) join the bottom, and makes an angle is arranged almost in

contact with the inside of L typeface of a printed-circuit board 30.

[0031] Signs 40 and 41 are the laminating flexible films of the abbreviation square which is called TAB and which has wiring structure inside, and carry one aforementioned drive 20 and ICs 21, respectively. A glass substrate 13 is pasted in the connection field 46 on the aforementioned shelf 15 with which the downward glass substrate 13 projects and is formed, and TAB 40 and 41 is making connection with a liquid crystal cell 11 from this drive 20 and ICs 21 with the wiring 45 in TAB with which it connects with a liquid crystal cell 11. The wiring 45 in TAB is connected with the output terminal bump 25 prepared the liquid crystal cell side length side of drive 20 and ICs 21. It sees from a liquid crystal cell 11, the end-connection children 42 and 43 are formed in the right-and-left ends of TAB 40 and 41, and it has connected with the end-connection children 22 and 23 of both the shorter sides of the aforementioned drive 20 and ICs 21 through the bypass wiring 44 in TAB, respectively. Moreover, the X [ which adjoins a printed-circuit board 30 and is arranged ], and Y side, one TAB 40 and 41 was wearing the upper surface of a printed-circuit board 30 partially, and has connected it to TAB 40 and 41, respectively from the output terminals 31 and 32 prepared in the upper surface of this printed-circuit board 30.

[0032] In this example, although all drives 20 and ICs 21 may be equipped with bypass wiring, the drive [ ICs / 20 and 21 ] 20 and ICs 21, i.e., the furthest drive from a printed-circuit board 30, which comes to the last of the train of connection between ICs does not need to be equipped with bypass wiring.

[0033] By the above-mentioned composition, it connects with the wiring 24 in the drive IC 20 of the wiring 44 and 1 in TAB40 of 1, the wiring 44 in same TAB40 of 1, the wiring 44 in TAB40 of adjoining others, and other drives IC 20 on these TAB40 of other sequentially from the aforementioned printed-circuit board 30. It sees from a printed-circuit board and connects with 3rd TAB40 and drive IC 20 similarly from 2nd TAB40 and drive IC 20.

[0034] By the above-mentioned composition, in the liquid crystal display of a TAB method, since it is not necessary to establish the bypass wiring in a printed-circuit board, and a cascade connection, wiring becomes easy. Moreover, since the portion which saw from the liquid crystal cell 11 and had jumped out on the outside of drive 20 and ICs 21, i.e., the input terminal portion of TAB 40 and 41, and a bypass wiring portion are settled between drives 20 and ICs 21, only the part can make small area of the portion in a liquid crystal display panel which is not displayed.

[0035] Next, the 2nd example of this invention is explained based on drawing 3 -4.

[0036] A sign 2 shows the liquid crystal display which has a COG (Chip On Glass) method mechanism. Although the composition of a liquid crystal cell 11 is the same as that of the 1st example, the area of the shelf 15 with which the downward substrate 13 projected is formed quite more greatly than the 1st example.

[0037] A sign 20 is IC chip for a signal-line drive (henceforth an X side IC chip), a predetermined interval is set and three pieces are directly laid in shelf 15a by the side of the long side of a liquid crystal cell 11. A sign 21 is a scanning-line mechanical-component side IC chip (henceforth a Y side IC chip), and two pieces are directly laid in shelf 15b by the side of the shorter side of a liquid crystal cell 11. The X side and a Y side IC chip are abbreviation rectangles, and the length of the long side is 3 or more times of the length of a shorter side. Moreover, the X side and the Y side IC chips 20 and 21 have the bypass wiring 24 from a demerits side side to another shorter side side inside, and the input/output terminals 22 and 23 of these wiring are formed in both the shorter side lower part.

[0038] Drawing 4 is the plan seen from the upper part (display side) of the liquid crystal cell 11 which shows connection of wiring to the above-mentioned drive 20 and ICs 21. The bump 25 for an output to a liquid crystal cell 11 is formed in the liquid crystal cell side length side lower part of this drive 20 and ICs 21, and the terminals 22 and 23 for outputting and inputting drive power supply current and an earth current from the aforementioned connection wiring substrate 30 to a control signal row are formed in both the shorter side lower part as a bump. The length of drive IC 20 and the bypass wiring 24 in 21 is 3 or more times of the length of the wiring 51 between ICs formed as metal wiring on the glass substrate.

[0039] Although it sees from the liquid crystal cell of these ICs 20 and 21 for a drive and the end-connection child is not prepared in an outside long side lower part, the dummy bump 26 for arranging IC



for a drive stably is formed. Connection with the first IC for a drive from a printed-circuit board 30 is made through the wiring 51 on the terminal 33 linked to the shelf 15 of the aforementioned glass substrate, and this shelf 15 from a printed-circuit board.

[0040] In this example, the drive 20 and ICs 21 which sees from a printed-circuit board 30 and is arranged at the last of the train of connection between ICs does not need to be equipped with the bypass wiring in IC.

[0041] Since the area of the shelf 15 which the downward glass substrate 13 projected from the liquid crystal cell 11 is sharply reducible in the liquid crystal display of a COG method with the above-mentioned composition compared with the conventional technology, the area of the non-display field of a liquid crystal display is sharply reducible. Moreover, since the great portion of bypass wiring formed in order to tell a control signal to two or more drives 20 and ICs 21 can form bypass wiring in a straight line, it it not only serves as IC20 and the bypass wiring 24 in 21, but can make the length of wiring the shortest. Therefore, all are mostly had and formed in a metal thin film portion with large electric resistance on a glass substrate 13, and in order [ of bypass wiring ] to bend to several steps moreover, wiring can make wiring resistance small compared with the conventional technology which was long.

[0042] Next, the 3rd example of this invention is explained based on drawing 5 and 6.

[0043] In the 3rd example, through, drive power supply current, and the earth current supply only control signal current to each drive IC 20 in the structure of the 2nd example from the bypass wiring which prepared independently in glass substrates 12 and 13 at internal bypass wiring of the drive IC 20 by the side of X.

[0044] a sign 54 -- drive power supply current main bypass wiring -- it is -- a part top for the shelf 15 of a glass substrate -- setting -- in view of a liquid crystal cell 11 -- the outside of drive IC 20 -- the train of drive IC 20, and abbreviation -- parallel one -- it is comparatively prepared as latus metal thin film wiring of width of face As shown in the plan of drawing 5 , from the drive power supply current main bypass wiring 54, two or more drive power supply current service wire 58 branched and extended, and it has connected with the input terminal which saw from the liquid crystal cell 11 of each drive IC 20, and was prepared the outside long side.

[0045] A sign 55 is earth-current main bypass wiring, and is prepared all over the field which pinches a sealing compound 18 with the inferior-surface-of-tongue edge 13 of the upper glass substrate 12, i.e., a downward glass substrate. The sealing compound 18 is closing the liquid crystal matter 17 in 4 rounds of a liquid crystal cell 11. The earth-current main bypass wiring 55 is comparatively formed as latus metal thin film wiring of width of face, is covered in the overcoat layer 19, and is insulated with other electric wiring of the upper glass substrate 12, and the electrode. This earth-current main bypass wiring 55 is connected to each drive IC 20 through the transfer 56 of the approximate circle pilaster which penetrates sealing-compound 18 field up and down, and the earth-current service wire 57 prepared as metal thin film wiring on the downward glass substrate 13.

[0046] According to the above-mentioned structure, since the current capacity of a drive power supply line or an earth-current line is large, when it is not necessarily appropriate to let the bypass wiring in IC pass, the effect of the 2nd example of the above can be attained easily. Furthermore, by being arranged on the outside of drive IC 20 or a liquid crystal cell 11, the drive power supply line 54 and the earth-current line 55 contribute some, when covering them electrically from the outside.

[0047]

[Effect of the Invention] Since the wiring for telling current, such as a control signal from the outside, to two or more drives IC is contained between the interior of Drive IC, and Drive IC by the structure of the display of this invention, area as which a picture is not displayed in a liquid crystal display can be made small. Moreover, since it becomes simple wiring, a manufacturing process can be simplified and poor wiring can be reduced.

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[Translation done.]

## TECHNICAL FIELD

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[The technical field to which invention belongs] this invention relates to the wiring at the time of two or more IC chips being arranged by \*\*\*\* of this display at a single tier, and mounting structure about IC chip used for matrix type display and this.

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[Translation done.]

## PRIOR ART

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[Description of the Prior Art] Wiring and mounting structure of the conventional liquid crystal display are explained based on drawing 7 -10.

[0003] The 1st wiring and mounting structure are explained based on drawing 7 -9.

[0004] The matrix type liquid crystal display 100 is constituted by the printed-circuit board 130 which supplies a control signal to the drive IC chip 120,121 which drives a liquid crystal cell 111 and a liquid crystal cell, and a drive IC chip, and the wiring structure which connects them. A liquid crystal cell 111 sandwiches the liquid crystal matter 117 in the shape of sandwiches combining two transparent substrates 112,113 which usually consist of glass, and the sealing compound 118 is allotted to 4 rounds of this liquid crystal matter. On the downward (seeing from a display side background) transparent substrate 113 (array substrate), switching elements, such as a TFT transistor for turning a pixel and a pixel on and off, are formed in the shape of a matrix. And two or more IC chips 120,121 for a drive of this liquid crystal cell 111 for driving [ in / 2 \*\*\*\* / at least ] the aforementioned switching element are arranged for every end side.

[0005] In such structure common to a matrix type liquid crystal display, this IC chip 120,121 for a drive is carried on TAB140,141, and the connection with the matrix-like wiring in a liquid crystal cell 111 from this IC chip 120,121 for a drive is made by the wiring 145 packed into TAB140,141, and the end-connection child. The transparent substrate 113 of the lower part of a liquid crystal cell 111 projects from a liquid crystal cell 111, and connection between TAB140,141 and a liquid crystal cell 111 is made in the shelf 115 the bottom.

[0006] The input from the aforementioned printed-circuit board 130 to this IC120,121 for a drive is performed through the contact hole 132 for branching from two or more bypass wiring 131 embedded to the printed-circuit board 130 interior of this, and those each, and pulling out on the front face of this printed-circuit board 130, the output terminal 133 prepared in this printed-circuit board 130 front face and the input terminal 142 of TAB140,141, and the wiring 147 in TAB.

[0007] The above connections with IC120,121 for a drive from a printed-circuit board 130 are called cascade connection from bypass wiring.

[0008] With such structure, in order to see end-connection child 142 portion to about [ that wiring becomes complicated ] and TAB140,141, and bypass wiring 131 portion in a printed-circuit board 130 from a liquid crystal cell and to prepare in the outside of the IC chip 120,121 for a drive, TAB140,141 portion and a printed-circuit board 130 will become that much large.

[0009] The 2nd wiring and mounting structure are explained based on drawing 10.

[0010] In the structure common to the above matrix type liquid crystal displays, the shelf 115 which the downward transparent substrate 113 projected from the liquid crystal cell 111 is formed quite greatly, the aforementioned IC chip 120,121 for a drive is directly laid on a part for this shelf 115, and the connection wiring to a liquid crystal cell 110 from this IC chip 120,121 for a drive is formed as a direct metal thin film on this shelf 115. Moreover, the bypass wiring 151 for telling the control current etc. from a printed-circuit board 130 to the IC chip 120,121 is altogether formed on the shelf 115 which the transparent substrate of the aforementioned lower part projected. Although two or more bypass wiring 151 on the shelf 115 of a transparent substrate is seen from a liquid crystal cell 111 and it is allotted to the outside of the IC chip 120,121, it did not have branching but the detour which is once hidden in the bottom, and makes a U-turn and comes out in each drive IC chip 120,121 is accomplished. Here, connection between the bypass wiring 151 and the drive IC chip 120,121 is made by the output terminal 153 prepared in the place where the detour of the bypass wiring 151 is hidden in the drive IC chip bottom, and the IC input terminal 127 which saw from the liquid crystal cell 111 of this drive IC chip 120,121, and was prepared in the outside \*\*\*\* bottom.

[0011] TAB140,141 which looked at from the liquid crystal cell 111, and has been projected outside according to the above-mentioned structure while becoming simple wiring structure compared with the wiring using the cascade connection in the 1st aforementioned wiring is lost.

[0012] However, in the 2nd wiring and mounting structure, since area of a picture non-display field in a

liquid crystal display panel was not able to be made sufficiently small since it projects from a liquid crystal cell 111 and the area for a shelf 115 becomes large the bottom, and the long bypass wiring 151 of line length was altogether formed by the metal thin film on a transparent substrate, there was a problem that wiring resistance became large.

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[Translation done.]

## EFFECT OF THE INVENTION

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[Effect of the Invention] Since the wiring for telling current, such as a control signal from the outside, to two or more drives IC is contained between the interior of Drive IC, and Drive IC by the structure of the display of this invention, area as which a picture is not displayed in a liquid crystal display can be made small. Moreover, since it becomes simple wiring, a manufacturing process can be simplified and poor wiring can be reduced.

## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] In the above Prior arts, it was difficult in matrix type display to make sufficiently small area of the portion as which the picture in a display panel is not displayed. Moreover, in the COG method which can make this area comparatively small, in order to form the bypass wiring for Drive IC as a metal thin film on a transparent substrate, wiring resistance is strong, the functional disorder and also poor display of the drive IC by the bird clapper were caused, and it had become a problem.

[0014] Then, this invention offers the matrix type display which can do wiring and mounting work easy while being able to make area of a non-display portion small into a display panel in view of the above troubles.

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[Translation done.]

## MEANS

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[Means for Solving the Problem] In the display with which, as for the display of the claim 1 of this invention, two or more drive IC chips aligned along the end side of one [ at least ] aforementioned electrode substrate at the single tier including the electrode substrate of a couple It has the bypass wiring in IC whose aforementioned drive IC short-circuits a bypass input terminal, a bypass output terminal, and an ends child. By connecting the aforementioned bypass wiring output terminal of the aforementioned drive IC of 1 to the input terminal of other aforementioned drives IC through drive-IC connection wiring With the control signal with which it connects mutually and two or more aforementioned drives IC are supplied to the drive IC of the above 1, or the aforementioned control signal Both power supply current, or both [ one side or ] is inputted into the aforementioned bypass input terminal of the drive IC of the above 1, and they are supplied to the drive IC of above others through the aforementioned bypass output terminal from the aforementioned bypass wiring in IC.

[0016] Since it is contained between the interior of Drive IC, and Drive IC in the form which the wiring for telling the control signal from the outside penetrates two or more drives IC to two or more drives IC, and connects to them by the above-mentioned composition and both power supply current, or both [ one side or ] is further contained similarly depending on the case, area as which a picture is not displayed in a liquid crystal display can be made small. Moreover, since it becomes simple wiring, a manufacturing process can be simplified and poor wiring can be reduced.

[0017] The display of a claim 2 is connected to the output terminal prepared in other shorter sides from the input terminal prepared the demerits side of the drive IC of a flat-surface rectangle by the bypass wiring in IC in the thing of a claim 1.

[0018] Distance of wiring between ICs can be made into the shortest by such composition.

[0019] The display of a claim 3 on the shelf which one side of two electrode substrates which form the aforementioned display panel projected outside, and formed in the upper surface in the thing of a claim 1 The drive IC chip which drives the aforementioned electrode substrate is carried directly, and the aforementioned drive-IC connection wiring is directly formed in shelving of the aforementioned electrode substrate, and is mutually connected through the aforementioned IC connection wiring of shelving of two or more aforementioned drives IC of the aforementioned electrode substrate.

[0020] Since the ratio into which the thin film wiring on a transparent substrate occupies the area of the same non-display field as a claim 1 in addition to the operation made small can be lessened according to the above-mentioned structure, the functional disorder of the drive IC by wiring resistance which becomes a problem by the COG method can be reduced.

[0021] In the thing of a claim 1, the aforementioned drive IC chip is carried on TAB, the aforementioned drive-IC connection wiring is formed into TAB, and, as for the display of a claim 4, two or more aforementioned drives IC are mutually connected through the aforementioned IC connection wiring under above TAB.

[0022] The display of a claim 5 forms the main bypass wiring in shelving of the aforementioned electrode substrate in the thing of a claim 3. Two or more service wire which branches from the aforementioned main bypass wiring and is connected with each aforementioned drive IC, respectively is prepared. Both or one side of the aforementioned power supply current and the aforementioned earth current is supplied to two or more aforementioned drive IC chips through the aforementioned main bypass wiring and the aforementioned service wire, respectively. The aforementioned control signal is supplied to two or more the aforementioned drives IC of all through the bypass input terminal of the drive IC of 1, the aforementioned bypass wiring in IC, and the aforementioned wiring between ICs.

[0023] The display of a claim 6 forms the main bypass wiring in the thing of a claim 3 on the aforementioned electrode substrate in which the aforementioned drive IC was carried, and the substrate of another side which makes a pair. Two or more service wire which branches from the aforementioned main bypass wiring and is connected with each aforementioned drive IC, respectively is prepared. Both or one side of the aforementioned power supply current and the aforementioned earth current is supplied to two or more aforementioned drive IC chips through the aforementioned main bypass wiring and the

aforementioned service wire, respectively. The aforementioned control signal is supplied to two or more the aforementioned drives IC of all through the bypass input terminal of the drive IC of 1, the aforementioned bypass wiring in IC, and the aforementioned wiring between ICs.

[0024] The bypass input terminal and the bypass output terminal were prepared in IC main part, and IC chip for a display drive of a claim 7 is equipped with the bypass wiring in IC which short-circuits the aforementioned bypass input terminal and the aforementioned bypass output terminal.

[0025] In IC chip of a claim 7, as for IC chip of a claim 8, the aforementioned bypass output terminal is prepared other demerits sides where the aforementioned bypass input terminal is prepared and counters it the demerits side of the aforementioned IC chip main part of a flat-surface rectangle.

[0026]

[Embodiments of the Invention] Hereafter, the 1st example of this invention is explained based on drawing 1 -2.

[0027] A sign 1 shows the liquid crystal display which has the structure called a TAB method or OLB (Outer Lead Bonding) method. the liquid crystal matter -- two glass substrates 12 and 13 -- inserting -- a liquid crystal cell 11 -- forming -- \*\*\*\* -- the upper part (side front) of this liquid crystal cell -- all are the image display fields 16 of a liquid crystal display 1 mostly Here, the size of the downward glass substrate 13 is somewhat larger than a glass substrate 12, and the shelf 15 which the downward glass substrate projected is formed in one long side of a liquid crystal cell 11, and one shorter side.

[0028] It is IC chip for a signal-line drive (henceforth an X side IC chip), and a sign 20 sets a predetermined interval, and three pieces approach shelf 15a by the side of the long side of a liquid crystal cell 11, and it is arranged.

[0029] A sign 21 is a scanning-line mechanical-component side IC chip (henceforth a Y side IC chip), and two pieces approach shelf 15b by the side of the shorter side of a liquid crystal cell 11, and it is arranged. The X side and a Y side IC chip are abbreviation rectangles. Moreover, the X side and a Y side IC chip have the bypass wiring 24 from a demerits side side to another shorter side side inside, and the input/output terminals 22 and 23 of these wiring are formed in both the shorter side lower part.

[0030] A sign 30 is a printed-circuit board and is a connection wiring substrate for making connection from an external input signal line and the drive IC chip 20, and connection between 21. This printed-circuit board has the form cut out from the abbreviation square by the abbreviation square in one angle, i.e., thick L typeface, and the portion which it projects from a liquid crystal cell 11, and shelf 15a by the side of the angle of the aforementioned shelf 15, i.e., the long side of a liquid crystal cell, (X side) and shelf 15b by the side of a shorter side (Y side) join the bottom, and makes an angle is arranged almost in contact with the inside of L typeface of a printed-circuit board 30.

[0031] Signs 40 and 41 are the laminating flexible films of the abbreviation square which is called TAB and which has wiring structure inside, and carry one aforementioned drive 20 and ICs 21, respectively. A glass substrate 13 is pasted in the connection field 46 on the aforementioned shelf 15 with which the downward glass substrate 13 projects and is formed, and TAB 40 and 41 is making connection with a liquid crystal cell 11 from this drive 20 and ICs 21 with the wiring 45 in TAB with which it connects with a liquid crystal cell 11. The wiring 45 in TAB is connected with the output terminal bump 25 prepared the liquid crystal cell side length side of drive 20 and ICs 21. It sees from a liquid crystal cell 11, the end-connection children 42 and 43 are formed in the right-and-left ends of TAB 40 and 41, and it has connected with the end-connection children 22 and 23 of both the shorter sides of the aforementioned drive 20 and ICs 21 through the bypass wiring 44 in TAB, respectively. Moreover, the X [ which adjoins a printed-circuit board 30 and is arranged ], and Y side, one TAB 40 and 41 was wearing the upper surface of a printed-circuit board 30 partially, and has connected it to TAB 40 and 41, respectively from the output terminals 31 and 32 prepared in the upper surface of this printed-circuit board 30.

[0032] In this example, although all drives 20 and ICs 21 may be equipped with bypass wiring, the drive [ ICs / 20 and 21 ] 20 and ICs 21, i.e., the furthest drive from a printed-circuit board 30, which comes to the last of the train of connection between ICs does not need to be equipped with bypass wiring.

[0033] By the above-mentioned composition, it connects with the wiring 24 in the drive IC 20 of the



wiring 44 and 1 in TAB40 of 1, the wiring 44 in same TAB40 of 1, the wiring 44 in TAB40 of adjoining others, and other drives IC 20 on these TAB40 of other sequentially from the aforementioned printed-circuit board 30. It sees from a printed-circuit board and connects with 3rd TAB40 and drive IC 20 similarly from 2nd TAB40 and drive IC 20.

[0034] By the above-mentioned composition, in the liquid crystal display of a TAB method, since it is not necessary to establish the bypass wiring in a printed-circuit board, and a cascade connection, wiring becomes easy. Moreover, since the portion which saw from the liquid crystal cell 11 and had jumped out on the outside of drive 20 and ICs 21, i.e., the input terminal portion of TAB 40 and 41, and a bypass wiring portion are settled between drives 20 and ICs 21, only the part can make small area of the portion in a liquid crystal display panel which is not displayed.

[0035] Next, the 2nd example of this invention is explained based on drawing 3 -4.

[0036] A sign 2 shows the liquid crystal display which has a COG (Chip On Glass) method mechanism. Although the composition of a liquid crystal cell 11 is the same as that of the 1st example, the area of the shelf 15 with which the downward substrate 13 projected is formed quite more greatly than the 1st example.

[0037] A sign 20 is IC chip for a signal-line drive (henceforth an X side IC chip), a predetermined interval is set and three pieces are directly laid in shelf 15a by the side of the long side of a liquid crystal cell 11. A sign 21 is a scanning-line mechanical-component side IC chip (henceforth a Y side IC chip), and two pieces are directly laid in shelf 15b by the side of the shorter side of a liquid crystal cell 11. The X side and a Y side IC chip are abbreviation rectangles, and the length of the long side is 3 or more times of the length of a shorter side. Moreover, the X side and the Y side IC chips 20 and 21 have the bypass wiring 24 from a demerits side side to another shorter side side inside, and the input/output terminals 22 and 23 of these wiring are formed in both the shorter side lower part.

[0038] Drawing 4 is the plan seen from the upper part (display side) of the liquid crystal cell 11 which shows connection of wiring to the above-mentioned drive 20 and ICs 21. The bump 25 for an output to a liquid crystal cell 11 is formed in the liquid crystal cell side length side lower part of this drive 20 and ICs 21, and the terminals 22 and 23 for outputting and inputting drive power supply current and an earth current from the aforementioned connection wiring substrate 30 to a control signal row are formed in both the shorter side lower part as a bump. The length of drive IC 20 and the bypass wiring 24 in 21 is 3 or more times of the length of the wiring 51 between ICs formed as metal wiring on the glass substrate.

[0039] Although it sees from the liquid crystal cell of these ICs 20 and 21 for a drive and the end-connection child is not prepared in an outside long side lower part, the dummy bump 26 for arranging IC for a drive stably is formed. Connection with the first IC for a drive from a printed-circuit board 30 is made through the wiring 51 on the terminal 33 linked to the shelf 15 of the aforementioned glass substrate, and this shelf 15 from a printed-circuit board.

[0040] In this example, the drive 20 and ICs 21 which sees from a printed-circuit board 30 and is arranged at the last of the train of connection between ICs does not need to be equipped with the bypass wiring in IC.

[0041] Since the area of the shelf 15 which the downward glass substrate 13 projected from the liquid crystal cell 11 is sharply reducible in the liquid crystal display of a COG method with the above-mentioned composition compared with the conventional technology, the area of the non-display field of a liquid crystal display is sharply reducible. Moreover, since the great portion of bypass wiring formed in order to tell a control signal to two or more drives 20 and ICs 21 can form bypass wiring in a straight line, it is not only serves as IC20 and the bypass wiring 24 in 21, but can make the length of wiring the shortest. Therefore, all are mostly had and formed in a metal thin film portion with large electric resistance on a glass substrate 13, and in order [ of bypass wiring ] to bend to several steps moreover, wiring can make wiring resistance small compared with the conventional technology which was long.

[0042] Next, the 3rd example of this invention is explained based on drawing 5 and 6.

[0043] In the 3rd example, through, drive power supply current, and the earth current supply only control signal current to each drive IC 20 in the structure of the 2nd example from the bypass wiring which prepared independently in glass substrates 12 and 13 at internal bypass wiring of the drive IC 20

by the side of X.

[0044] a sign 54 -- drive power supply current main bypass wiring -- it is -- a part top for the shelf 15 of a glass substrate -- setting -- in view of a liquid crystal cell 11 -- the outside of drive IC 20 -- the train of drive IC 20, and abbreviation -- parallel one -- it is comparatively prepared as latus metal thin film wiring of width of face As shown in the plan of drawing 5 , from the drive power supply current main bypass wiring 54, two or more drive power supply current service wire 58 branched and extended, and it has connected with the input terminal which saw from the liquid crystal cell 11 of each drive IC 20, and was prepared the outside long side.

[0045] A sign 55 is earth-current main bypass wiring, and is prepared all over the field which pinches a sealing compound 18 with the inferior-surface-of-tongue edge 13 of the upper glass substrate 12, i.e., a downward glass substrate. The sealing compound 18 is closing the liquid crystal matter 17 in 4 rounds of a liquid crystal cell 11. The earth-current main bypass wiring 55 is comparatively formed as latus metal thin film wiring of width of face, is covered in the overcoat layer 19, and is insulated with other electric wiring of the upper glass substrate 12, and the electrode. This earth-current main bypass wiring 55 is connected to each drive IC 20 through the transfer 56 of the approximate circle pilaster which penetrates sealing-compound 18 field up and down, and the earth-current service wire 57 prepared as metal thin film wiring on the downward glass substrate 13.

[0046] According to the above-mentioned structure, since the current capacity of a drive power supply line or an earth-current line is large, when it is not necessarily appropriate to let the bypass wiring in IC pass, the effect of the 2nd example of the above can be attained easily. Furthermore, by being arranged on the outside of drive IC 20 or a liquid crystal cell 11, the drive power supply line 54 and the earth-current line 55 contribute some, when covering them electrically from the outside.

## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram of the liquid crystal display in which the 1st example of this invention is shown.

[Drawing 2] It is the plan showing wiring of TAB and Drive IC concerning the 1st example.

[Drawing 3] It is the perspective diagram of the liquid crystal display in which the 2nd example is shown.

[Drawing 4] It is the plan showing the drive IC concerning the 2nd example, and wiring of the circumference of it.

[Drawing 5] It is the plan concerning the 3rd example showing wiring of the drive power supply line to Drive IC, and an earth-current line.

[Drawing 6] It is drawing of longitudinal section of the liquid crystal display concerning the 3rd example.

[Drawing 7] It is the perspective diagram of the 1st conventional liquid crystal display.

[Drawing 8] It is drawing of longitudinal section showing the shelf which the composition of the liquid crystal cell of a liquid crystal display and the downward substrate projected.

[Drawing 9] It is the perspective diagram showing the wiring in TAB in the 1st conventional liquid crystal display, and the connection wiring to TAB.

[Drawing 10] It is the perspective diagram of the 2nd conventional liquid crystal display.

### [Description of Notations]

1 Liquid Crystal Display

2 Liquid Crystal Display

11 Liquid Crystal Cell

12 Glass Substrate

13 Glass Substrate

14 Polarization Film

15 Shelf with which Downward Glass Substrate Projects and is Formed

16 Image Display Field

20 21 Drive IC

22 Bypass Wiring Input Terminal

23 Bypass Wiring Output Terminal

24 Pie Path Wiring in IC

30 Printed-circuit Board

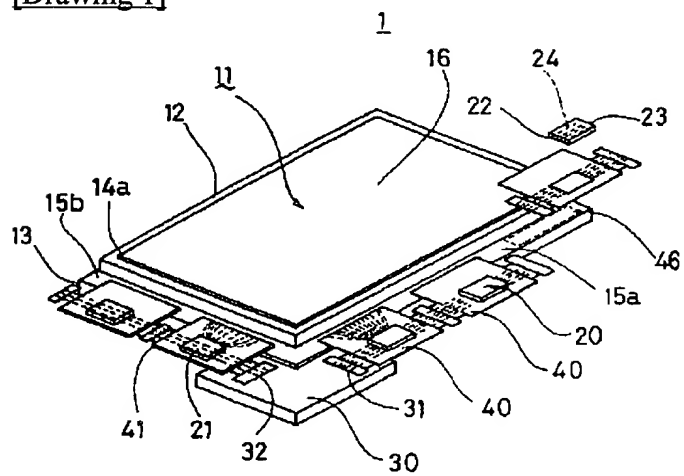
40,41 TAB

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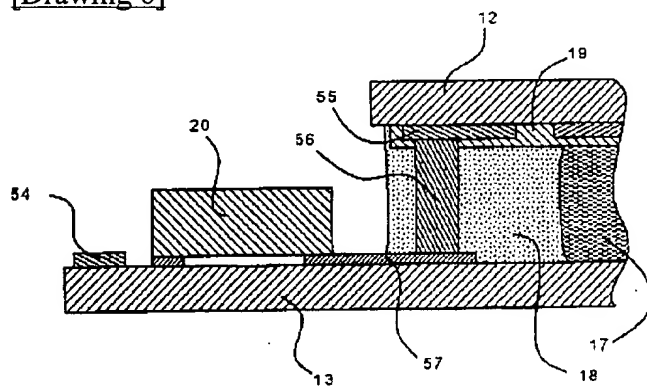
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## DRAWINGS

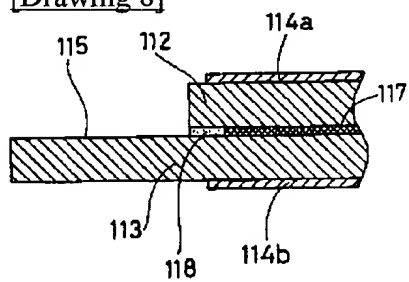
[Drawing 1]



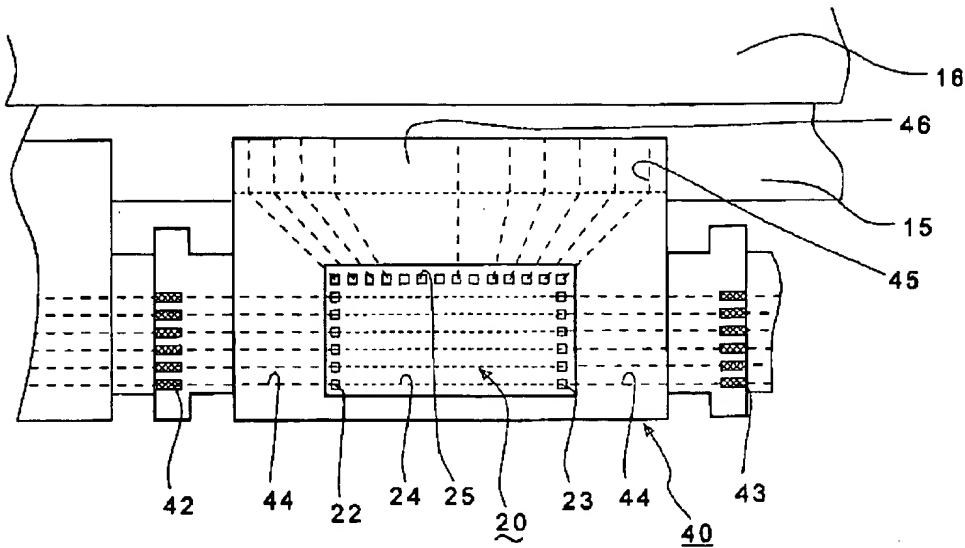
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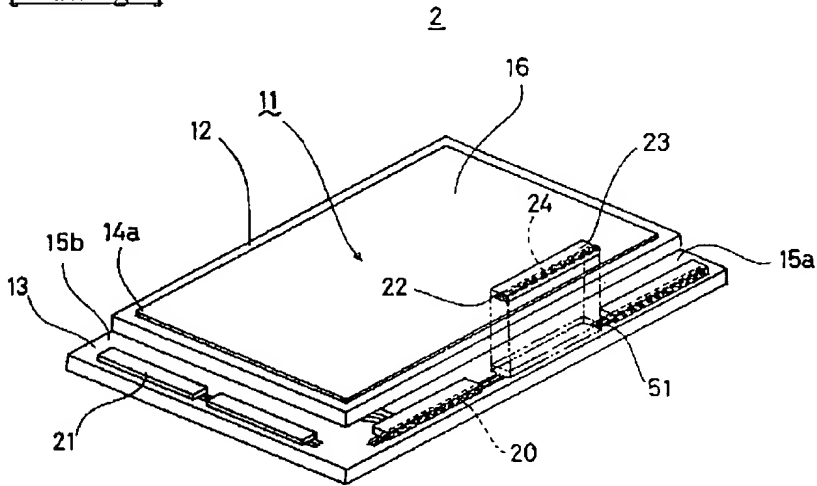
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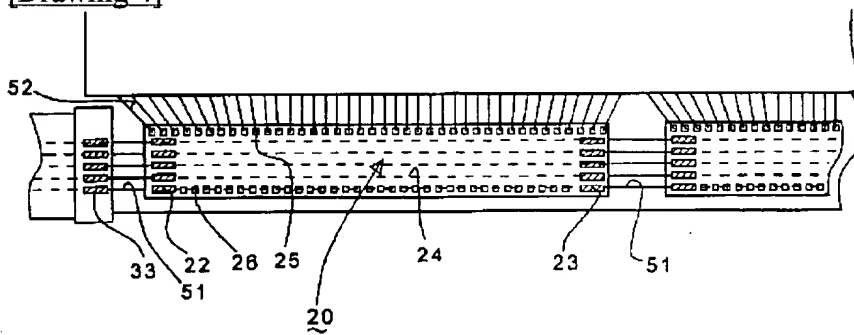
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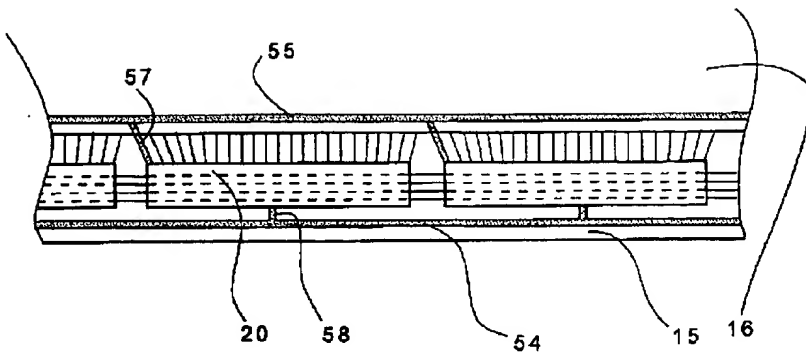
[Drawing 3]



[Drawing 4]

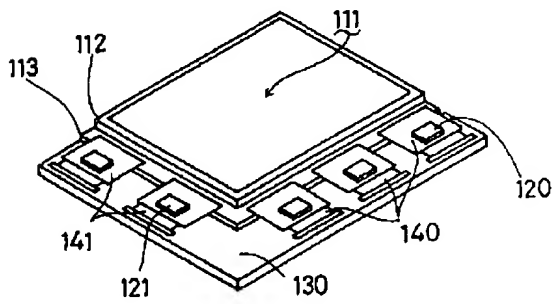


[Drawing 5]

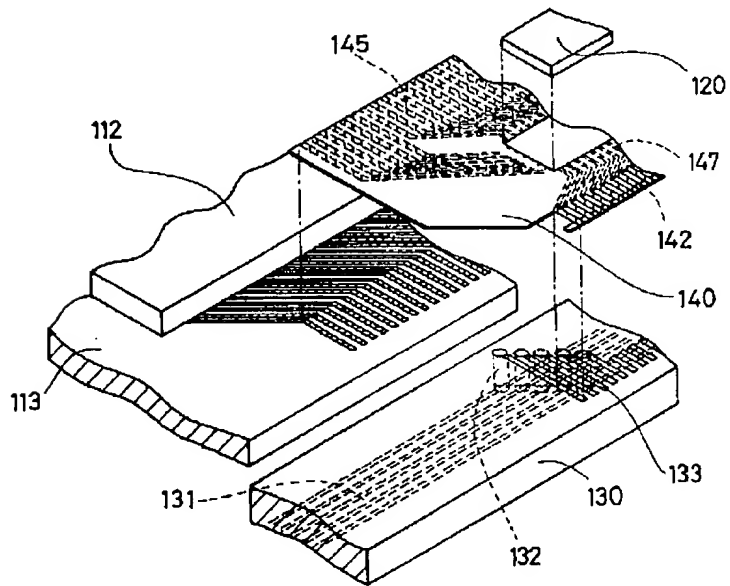


[Drawing 7]

100



[Drawing 9]



[Drawing 10]

200

